CHAPTER TWO
Definition of Project Features

INTRODUCTION

The purpose of this chapter is to provide a definition of the overall project features of multi-modal and multi-use corridors, as a basis for understanding the evaluation criteria for determining the feasibility of the WCC. As such, this chapter outlines the basic geometric components, operational requirements, typical uses, and the potential alignment alternatives of the WCC.

POTENTIAL COMPONENTS OF THE CORRIDOR

One of the key elements of the WCC project is the identification of required right-of-way (ROW) width in order to accommodate the vehicles, trucks, rail, non-motorized, and utility portions of the corridor. Using existing design standards and "best practices" the WSA team developed conceptual cross sections for each of the corridor components. Each of the following corridor components is discussed, and a corresponding cross section is presented:

Transportation

- Truck Freight - Exclusive commercial vehicle four-lane roadway.
- Rail Freight - Double track, shared with passenger rail.
- Passenger Car - Four lane roadway with weight limits.
- Passenger Rail - Double track, shared with freight rail.
- Non-motorized - Shared use path and separate equestrian trail.

Utilities

- Power - 500 kilovolt transmission line.
- Natural Gas - High pressure transmission line.
- Petroleum - Refined petroleum products.
- Telecommunication - Analog and digital communications.

Following the discussion of each corridor component, the maximum conceptual cross-section for the WCC is presented. This cross-section represents independent ROWs for each corridor component. A second conceptual cross section is also presented, representing a reasonable estimate of potential overlaps in ROW requirements.

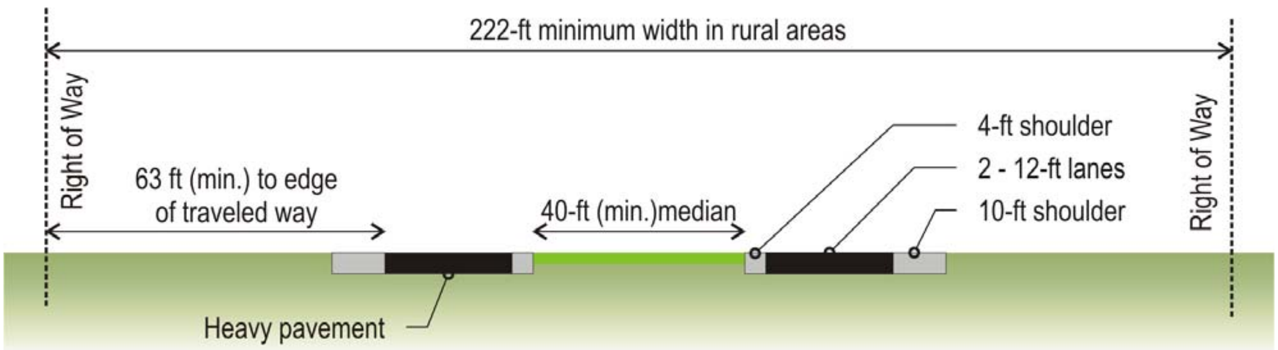
Preliminary Concept

This study is the evaluation of the feasibility of a concept that is likely to be long-term in its implementation. In order to accurately assess the feasibility of the concept, it is critical to first define the concept; that is the purpose of this section of the paper. It defines the concept physically and operationally; its width, its grade, its major components, etc. The concept shown herein is not considered final, but rather a beginning.

Truck Freight

The truck freight roadway would accommodate long-haul, commercial vehicles. Two lanes would be provided in each direction with median separation (see Exhibit 2-1). The roadway would be designed to WSDOT standards for Interstate highways with 12-foot traffic lanes, 10-foot right and four-foot left shoulders (WSDOT Design Manual, Figure 440-4). The minimum median width would be 40 feet. Minimum ROW width for an Interstate is 63 feet outside of the traveled way, requiring an overall minimum ROW of 222 feet. The pavement would be designed for the high volume of truck traffic and could accommodate legal load limits from Oregon and British Columbia.

Exhibit 2-1: Commercial Vehicle Roadway Cross Section



The criteria for grades in rural areas are shown in Exhibit 2-2. Grades one percent steeper may be used in urban areas if necessary, and on one-way down grades except in mountainous terrain. Independent alignments and grades for the two, two-lane roadways would be used where feasible.

Exhibit 2-3 shows the minimum curve radius, in feet, for several design speeds and superelevation rates. WSDOT allows a maximum 10 percent superelevation rate except in mountainous area or locations that regularly experience accumulation of snow or ice.

Exhibit 2-2: Maximum Grades for Commercial Vehicles

Type of Terrain	Design Speed (miles per hour)			
	50	60	70	80
Level	4 %	3 %	3 %	3 %
Rolling	5 %	4 %	4 %	4 %
Mountainous	6 %	6 %	5 %	5 %

Source: WSDOT Design Manual Supplement, Figure 440-4, July 22, 2003.

Exhibit 2-3: Minimum Curve Radii for Commercial Vehicles

Superelevation	Design Speed (miles per hour) 50	60	70	80
6%	840 ft	1,340 ft	2,050 ft	3,060 ft
8%	770 ft	1,210 ft	1,830 ft	2,680 ft
10%	700 ft	1,100 ft	1,640 ft	2,380 ft

Source: WSDOT Design, Figures 640-11a, 640-11b, and 640-11c, February 2002.

Passenger Car

The passenger car roadway cross-section would consist of two, 12-foot lanes in both directions separated by a 40-foot median. The minimum ROW width would be the same as the commercial vehicle roadway, at 222 feet as shown in Exhibit 2-4. The passenger car roadway would have a maximum gross vehicle weight limits allowing a substantially lighter and lower cost pavement than the truck roadway. This roadway would be constructed to WSDOT design criteria for Interstate highways including an 80 miles per hour design speed. The design speed can be reduced to 70 miles per hour in rolling terrain and 60 miles per hour in mountainous terrain. The 40-foot median is the minimum for rural areas. WSDOT states independent alignment and grade is desirable in all rural areas and where terrain and development permit in urban areas. The criteria for grades in rural areas are shown in Exhibit 2-5. Grades one percent steeper may be used in urban areas if necessary, and on one-way down grades except in mountainous area or locations that regularly experience accumulation of snow or ice.

Exhibit 2-4: General Purpose Roadway Cross Section

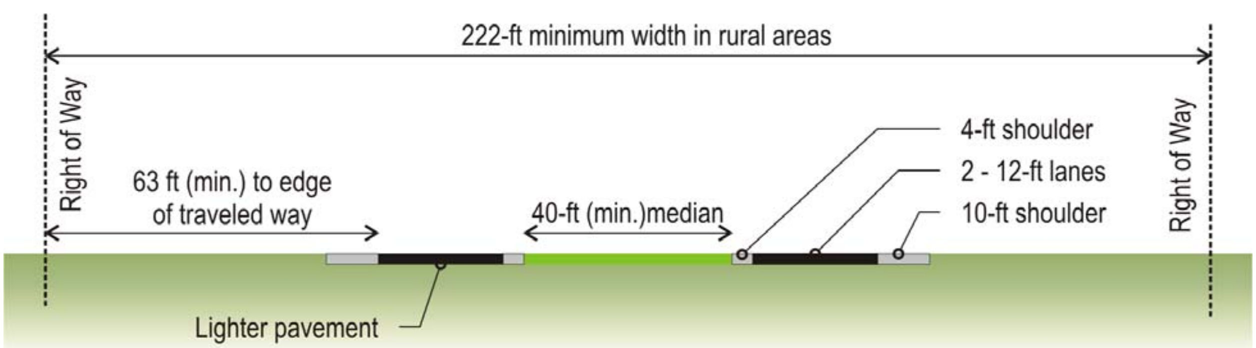


Exhibit 2-5: Maximum Grades for Passenger Vehicles

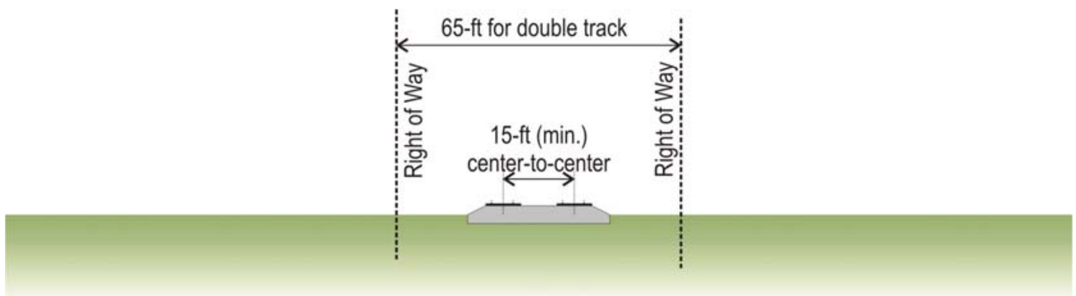
Type of Terrain	Design Speed (miles per hour) 50	60	70	80
Level	4 %	3 %	3 %	3 %
Rolling	5 %	4 %	4 %	4 %
Mountainous	6 %	6 %	5 %	5 %

Source: WSDOT Design Manual Supplement, Figure 440-4, July 22, 2003.

Rail Freight

The WCC would include a double track railroad line with Class 5 (Federal Railroad Administration designation) track where feasible. Class 5 track has a maximum allowable speed of 80 miles per hour for freight trains and 90 miles per hour for passenger trains. Minimum ROW requirements are based on two tracks spaced 15 feet apart, center to center, and a ROW extending 25 feet from the track centers for a width of 65 feet. The track grade should not exceed 1.5 percent. The conceptual cross section for the double track railroad is shown in Exhibit 2-6.

Exhibit 2-6: Double Track Railroad Cross Section



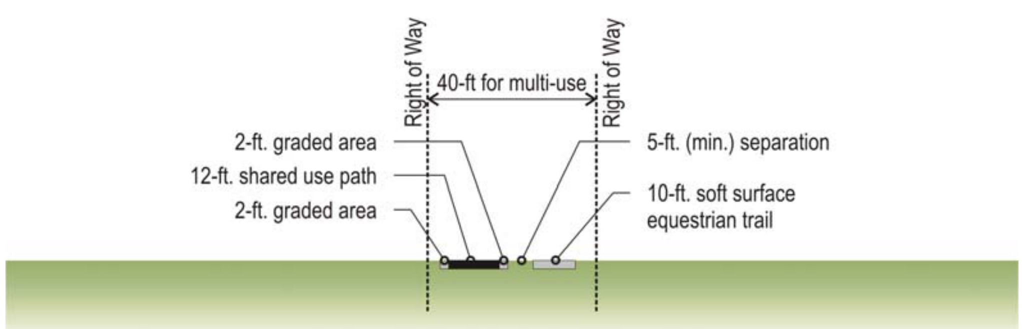
Passenger Rail

Passenger rail would share the two-track ROW with freight rail. Class 5 track standards would allow passenger train speeds of up to 90 miles per hour.

Non-Motorized Modes

Both a paved shared use path and soft-surfaced equestrian trail could be provided within a 40-foot ROW as shown in Exhibit 2-7. The shared use path would follow WSDOT Design Manual guidelines (DM 1020, May 2001). The 12-foot paved width would allow two-way travel for pedestrians and bicyclists. The pathway would be set back from the ROW edge to allow signage with adequate clearance from the traveled way. There would be a minimum five-foot separation between the shared pathway graded area and the equestrian trail.

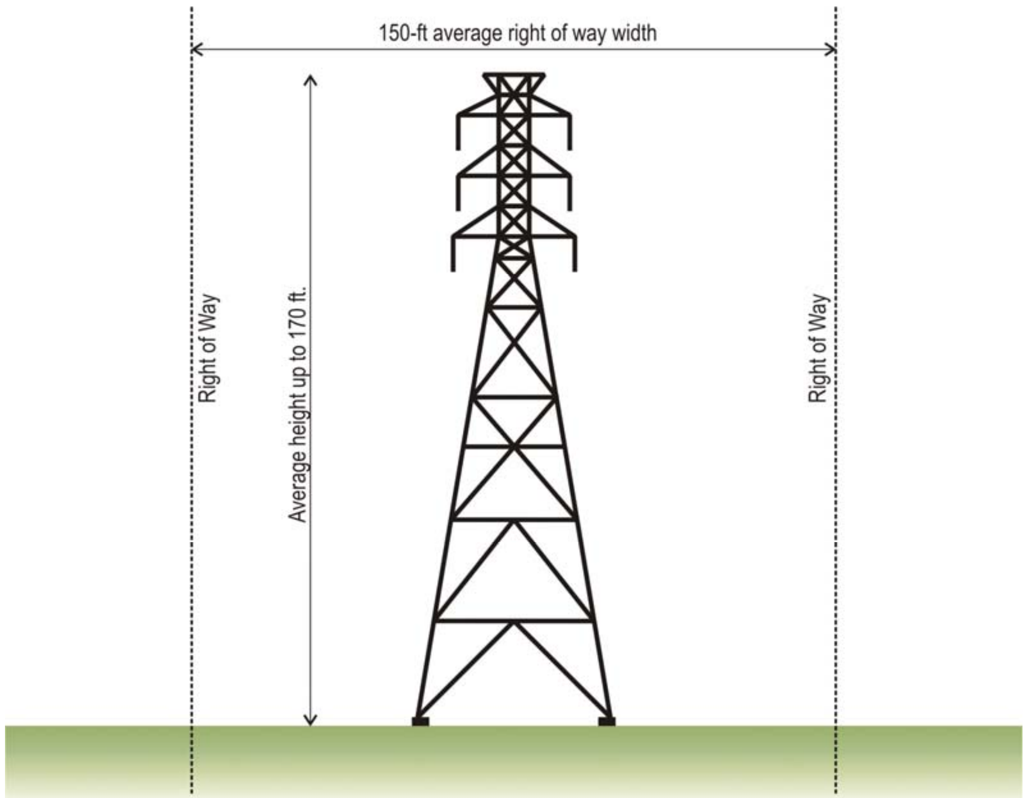
Exhibit 2-7: Non-Motorized Corridor Cross Section



Power

Exhibit 2-8 shows the configuration of a 500 kilovolt (kV), single-circuit, electric power transmission line. A lattice steel type tower is shown, but steel poles may also be used and would have similar ROW requirements. There would be about five towers per mile. Construction and maintenance access would typically be provided by a maintenance road within the ROW except where access is available from an adjacent road outside of the ROW. A single-circuit 500-kV line would require 150 feet if ROW width. Tower height would average about 135 feet. A double-circuit tower, with an average height of 170 feet, would require about 125 feet of ROW.

Exhibit 2-8: 500-kV Power Transmission Line



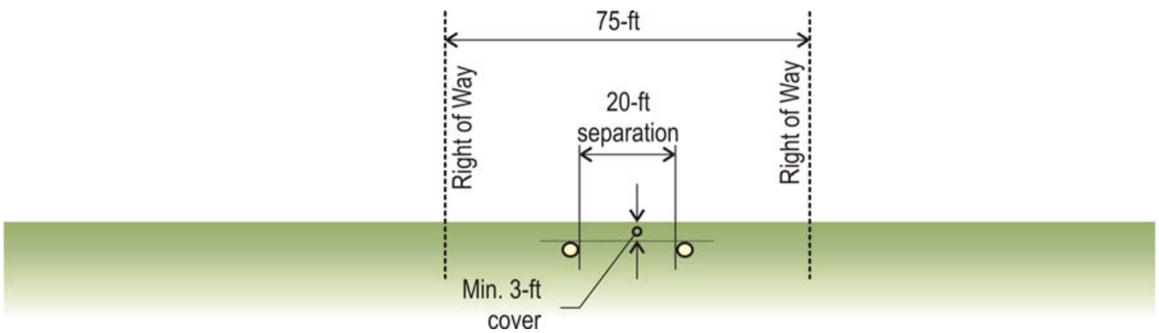
Natural Gas and Petroleum Pipelines

The WCC could provide a ROW for one or more high pressure gas and petroleum product transmission lines. A ROW width of 70 feet is shown in Exhibit 2-9. This is based on information provided by industries operating similar systems in the region. The pipelines would have 20 feet of separation between them. Pipeline ROW through Federal land are limited to 25 feet on both sides of the pipeline by law (30 USC Section 185).

The Federal government sets minimum safety standards for the design, operation, and maintenance of gas pipelines (49 CFR Part 192). In Washington State, pipelines are regulated by the Utilities and Transportation Commission. Transmission pipeline safety regulations are contained in the Washington Administrative Code (WAC) Title 480 Chapter 75, Hazardous Liquid, Gas, Oil and

Petroleum Pipeline Companies—Safety. The regulation adopts by reference, 49 CFR 192, American Society of Mechanical Engineers (ASME) Standard B31.4, and American Petroleum Institute (API) Standard 1104.

Exhibit 2-9: Natural Gas/Petroleum Pipeline ROW



Telecommunications

No separate ROW has been provided in the WCC corridor for telecommunications. The commercial vehicle and general purpose ROW would carry data lines for operation of intelligent transportation systems (ITS) features including advanced transportation management systems (ATMS), fiber optic cables, and advanced travel information systems (ATIS). The power transmission line and railroad ROW would also be potential locations for communications lines.

Overall Corridor Features

Exhibit 2-10 shows the maximum ROW requirement for a section of the corridor where conditions would allow all corridor elements to run side by side. All transportation and utility elements would require more than 700 feet. Exhibit 2-11 shows a minimum corridor with of width of about 500 feet that would be possible by the use of traffic barriers in the medians of the commercial vehicle and general purpose roadway, and between the two roadway pairs. Pipelines are shown located in an easement within the roadway ROW, but this would be possible only where there was no conflict with roadway drainage or other roadway elements and the pipeline had adequate access for maintenance. The double track railroad ROW has been reduced to 50 feet. The shared use (pedestrian and bicycle) path and equestrian trails may be compatible as allowed uses within the power transmission line easement. The shared use path could be designed to allow power line maintenance vehicle use.

Exhibit 2-10: Maximum Corridor ROW Width

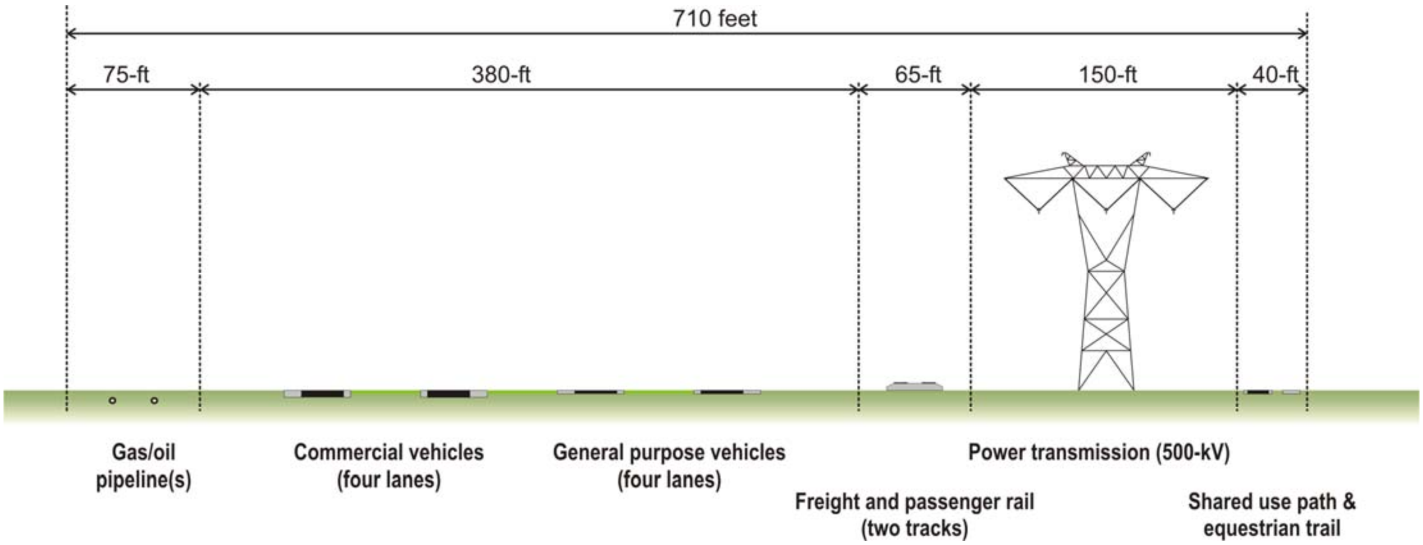
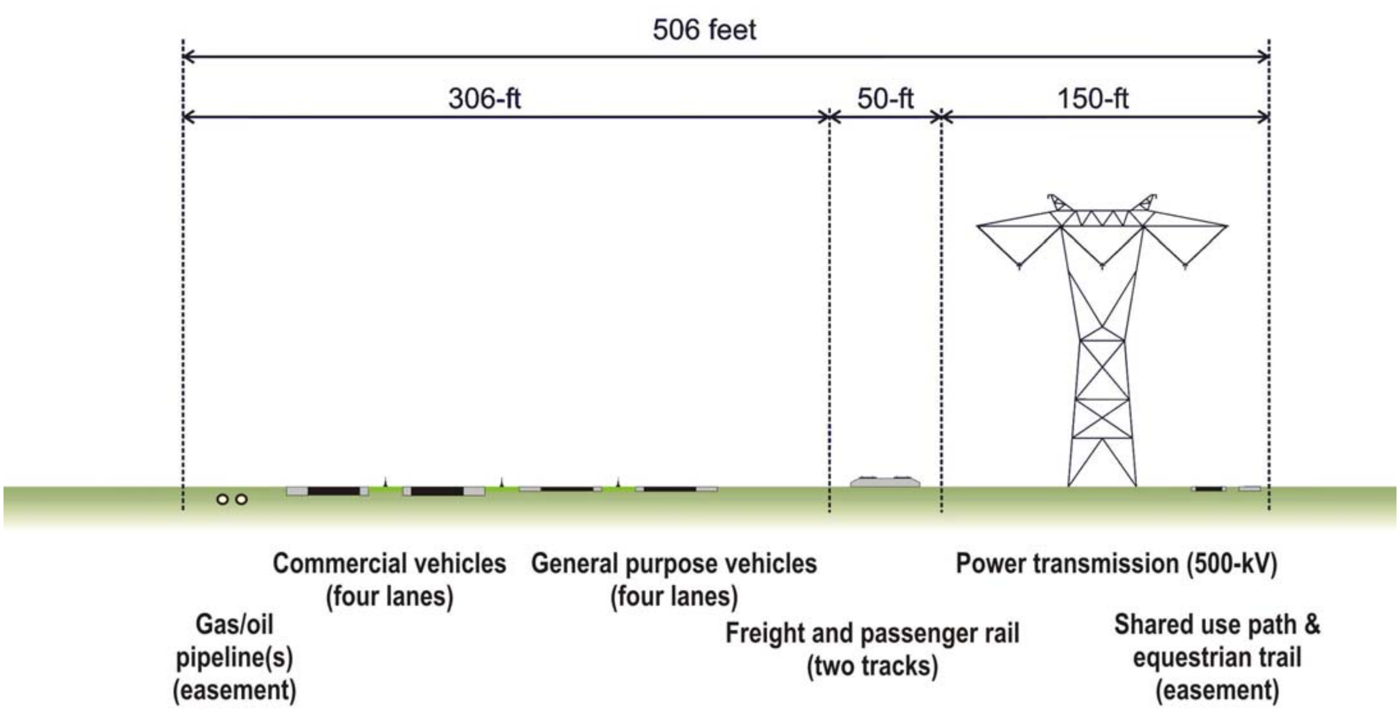


Exhibit 2-11: Minimum Corridor ROW Width



Probable Corridor Alignment Opportunities

As stated previously, this study is the evaluation of the feasibility of a concept that is likely to be long-term in its implementation (if it were to be implemented). In order to accurately assess the feasibility of the concept, it is critical to first define the concept. Therefore, this section defines the conceptual alignment alternative opportunities. The alignment opportunities discussed in this section are contingent upon broad concerns relating to environmental, topographic, geometric design, and socio-economic constraints that are detailed throughout the rest of this report. The alignment opportunities shown herein are not considered final, but rather a beginning. Throughout the course of the study, the physical components may be altered based on determination of feasibility.

The WSA Team has identified opportunities for alignments for the corridor on a broad scale. Due to the conceptual nature of the WCC feasibility study, the alignment opportunities presented in this chapter do not represent an actual location or alignment for the WCC project. The alignment opportunities were developed and identified using the following criteria:

Environmental Constraints

- Sensitive park lands and public lands were avoided wherever possible.

Topographic Constraints

- The rugged terrain in many parts of the study area limited potential alignment alternatives.
- The Cascade Mountains constrained the probable corridor alignment to the east.

Socio-Economic Constraints

- The probable corridor alignment avoids high-density populated areas wherever possible.
- Potential locations for east-west corridor connections were maximized.

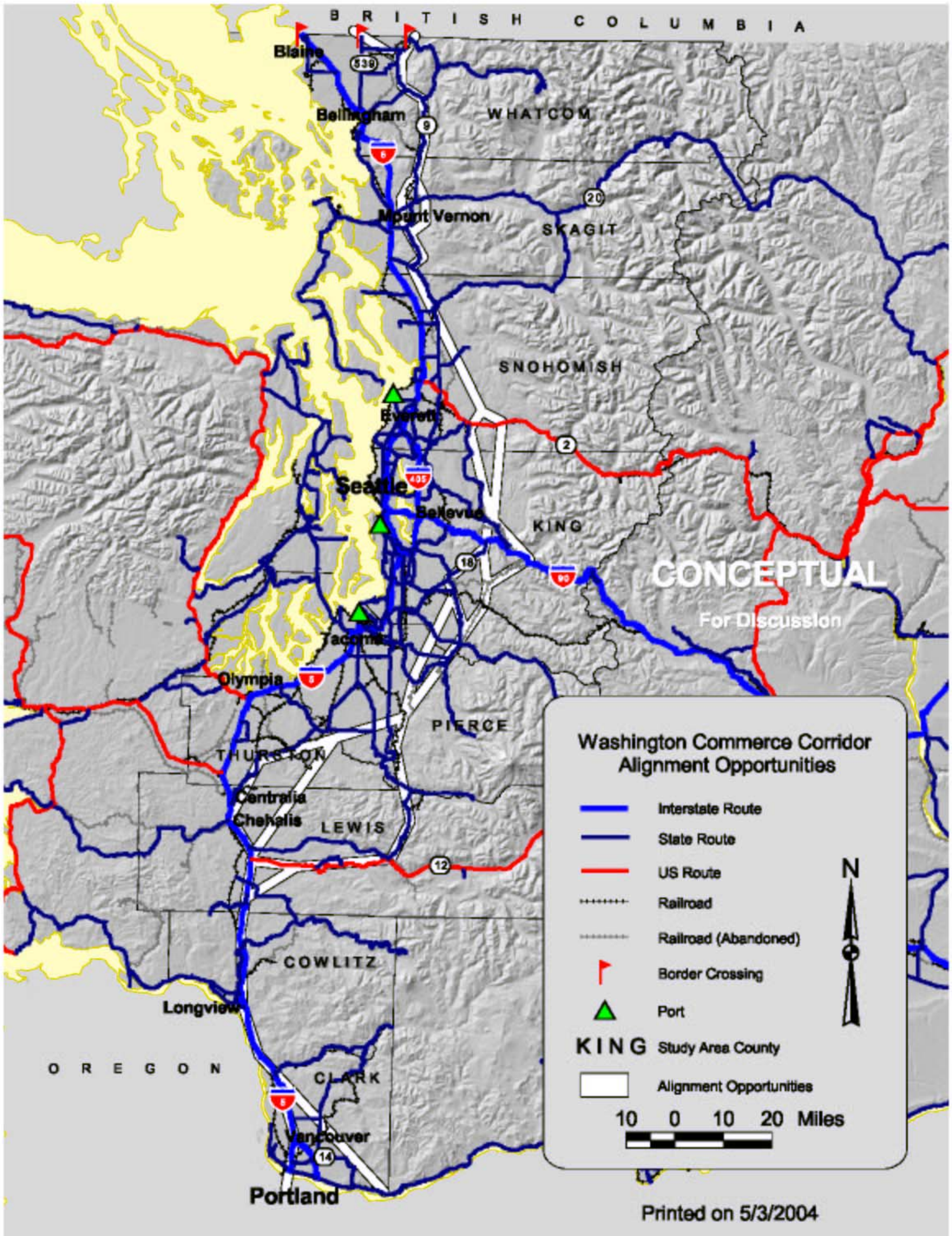
Coordination with Existing Rights-of-Way

- When possible, the probable corridor alignment follows existing rail lines or state highways, in order to minimize grade and topographic constraints.
- In some locations, the corridor alignment follows existing utility lines.

Based on the constraints and coordination opportunities presented above, the WSA Team identified the corridor alignment alternative opportunities shown in Exhibit 2-12. The probable WCC alignment opportunities include a number of alternate routes; however, the overall goals of the WCC would be achieved through any combination of these alignment alternatives.

Note that the alignment alternatives shown in Exhibit 2-12 do not represent the final location of the WCC. These alignment alternatives were developed based on a large-scale review of the entire study area.

Exhibit 2-12: Commerce Corridor Alignment Opportunities



EXAMPLES OF OTHER SIMILAR INITIAVES

The following section documents similar corridor initiatives developed and implemented in the United States. Three similar initiatives are discussed:

1. The Trans Texas Corridor Plan
2. The Interstate 81 Corridor Plan
3. The Alameda Corridor Project

Each of these initiatives provides important information that will help plan, design, construct, and finance the final WCC project. The WCC project will incorporate the appropriate elements of these similar initiatives in order to provide the most state-of-the-art solution.

Trans Texas Corridor Plan

Background and Description

Texas serves geographically as the funnel for a majority of the commodity flows to and from Mexico and other Latin American and global destinations. The state is a gateway for Latin American trade that flows throughout the rest of the Southeastern Transportation Alliance region and the U.S as a whole. Pursuant to the goals of the Southeastern Transportation Alliance region, improved mobility across the U.S.-Mexico border will help capitalize on international trade with Latin America.

Seventy-nine percent of all U.S.-Mexico trade passes through the Texas ports of entry. Under the North American Free Trade Agreement (NAFTA) this trade dynamic will expand even more. In addition, Texas' population has increased a staggering 65 percent since 1988 and population growth is projected to continue at a rate of 30,000 new residents a month.[1]

The movement of goods from the U.S.-Mexico border has origins and destinations throughout the U.S. that includes major markets on the West Coast, Midwest, Upper Midwest and the East Coast. In addition, the many shopping malls, grocery stores, and discount super-centers throughout the Border region attest to the numbers of Mexican nationals crossing the border to buy U.S. goods. The costs of building and maintaining infrastructure to service international trade, however, remains a challenge.

"On a typical day, about 205,000 vehicles and 97,000 pedestrians cross the Texas-Mexico Border. The 15,000 commercial trucks and 1,220 railcars that traverse the border daily highlight the importance of international trade to the region and the nation. [2]"

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[1] Website: http://www.dot.state.tx.us/ttc/ttc_report_summary.pdf.
[2] Keith Phillips and Carlos Manzanares, Transportation Infrastructure and the Border Economy, Federal Reserve Bank of Dallas, June 2001.

Goods movement between the U.S. and Mexico has increased steadily and dramatically over the past decades. The growth rate (in volume) accelerated during the 1990's to nearly double the growth rate of the 1980's.[3] International trade moving through Texas is expected to grow at a faster pace than domestic trade over the next 20 years. U.S.-Mexico trade crossing the state's numerous border facilities will be one of the fastest growing segments. Exhibit 2-13 shows the average annual percent change in volume of goods traded between the U.S. and Mexico.[4]

Exhibit 2-13: Change in Volume of Goods Traded Between the United States and Mexico

Value per Decade (billions)			Average Annual % Change	
1980	**1990**	**2000**	**1980-1990**	**1990-2000**
$28	$58	$207	7.6%	13.6%

Source: FHWA, Office of Freight Management and Operations.

Exhibit 2-14 presents information on freight shipments that have either an origin or a destination in Texas. As shown, trucks moved a large percentage of the tonnage and value of shipments, followed by rail. Truck traffic is expected to grow throughout the state over the next 20 years. Much of the growth will occur in urban areas and on the Interstate highway system.

Exhibit 2-14: Freight Shipments To, From, and Within Texas
Year 1998, 2010, and 2020

	Tons (millions)			Value (billions $)		
	1998	**2010**	**2020**	**1998**	**2010**	**2020**
State Total	1,764	1,376	2,625	2,347	1,428	3,676
By Mode						
Air	2	4	5	113	265	472
Highway	1,008	1,483	1,872	841	1,681	2,756
Other[a]	358	424	485	46	65	92
Rail	282	388	473	102	191	295
Water	113	145	155	23	42	12
Grand Total	1,763	2,444	2,990	1,125	2,244	3,627
By Destination/Market						
Domestic	1,258	682	1,749	2,114	892	2,720
International	506	694	876	233	536	953

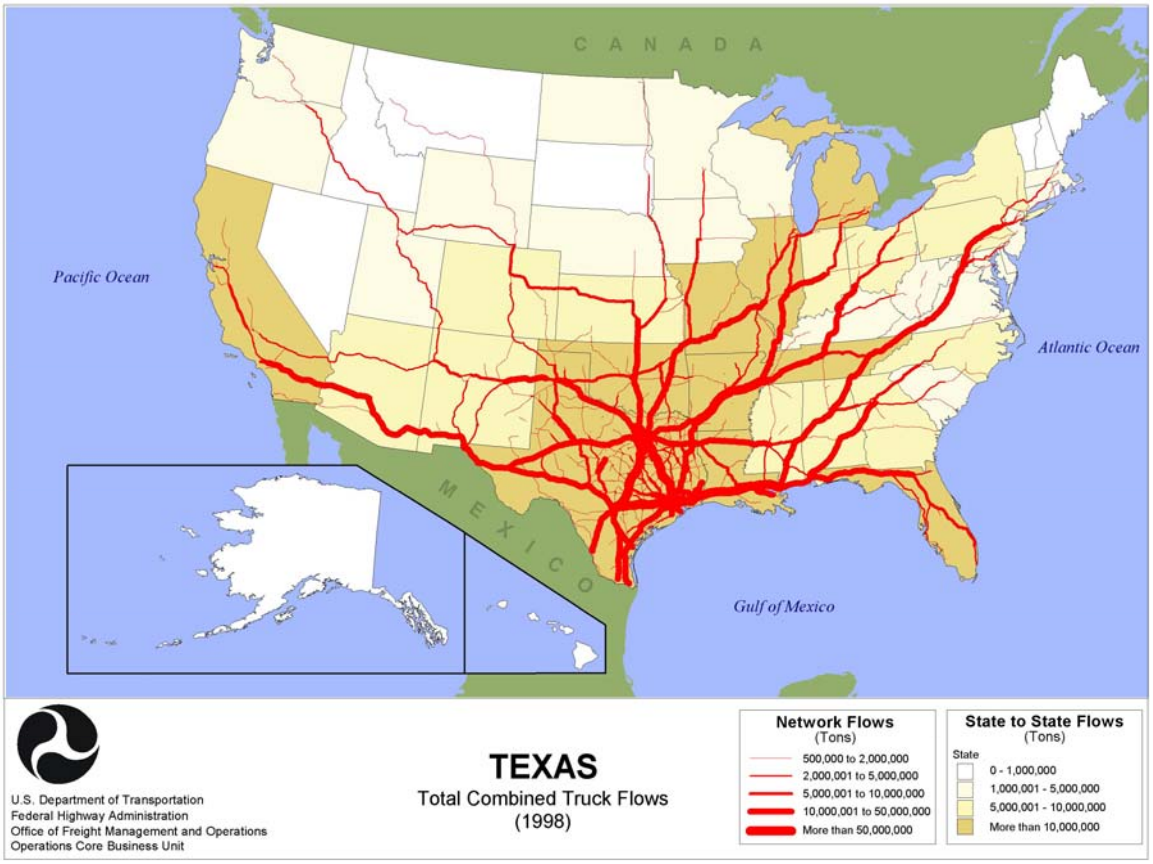
Source: FHWA, Office of Freight Management and Operations.
Notes: [a]Includes international shipments that moved via pipeline or by an unspecified mode.

Exhibit 2-15 shows freight flows to and from Texas. On average, truck traffic moving to and from Texas accounted for 20 percent of the Average Annual Daily Truck Traffic (AADTT) on the Freight Analysis Framework (FAF) road network. Approximately 27 percent of truck traffic involved in-state shipments, and 13 percent involved trucks traveling across the state to other markets. The top

[3] Laredo Development Foundation, "Laredo Texas Bordering the Future", using data from Texas A&M International University.
[4] Laredo Development Foundation.

commodities by weight are products related to natural resources and minerals. By value, the top commodities are chemical products and transportation equipment.[5]

Exhibit 2-15: Total Combined Truck Flows to and From Texas



Corridor Development

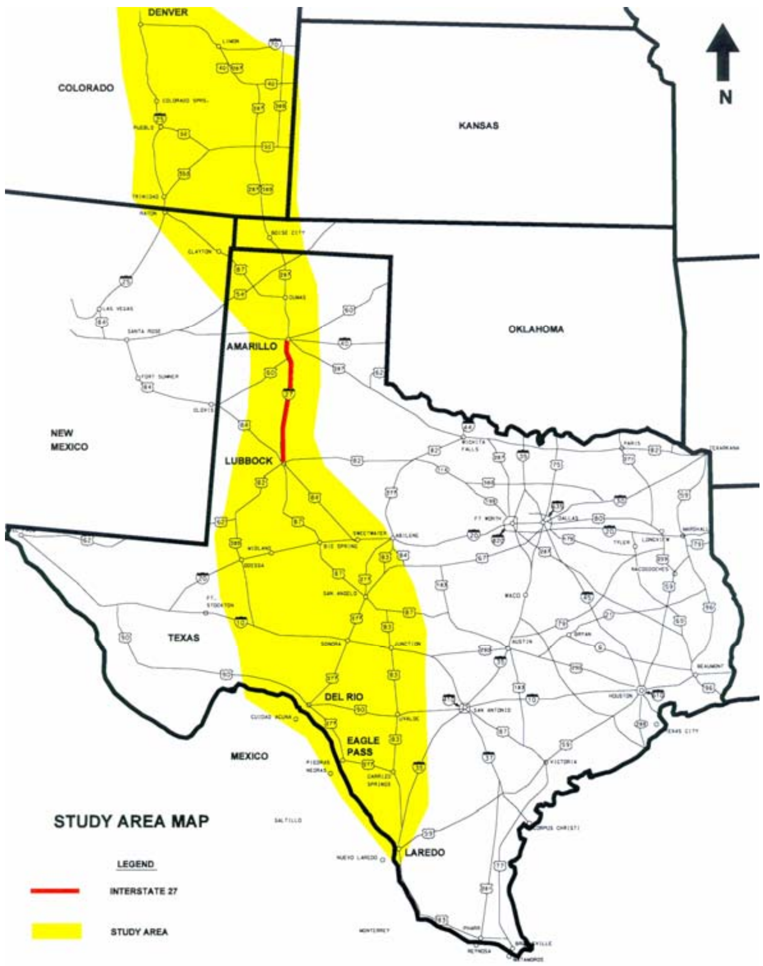
One of the corridors identified in the Trans Texas Corridor Plan follows the Ports to Plains Corridor alignment. Because of its direct connection to the Mexican border, the Ports to Plains Corridor was designated by TEA-21 as one of the 43 U.S. high priority corridors. A feasibility study was conducted in 2001. The study area traversed the states of Texas, New Mexico, Oklahoma, and Colorado. The Ports to Plains Corridor is approximately 800 miles long, with widths varying between approximately eight miles along the IH-27 alignment, and up to 200 miles south along the remainder of the corridor.

Elements of the study included a detailed and comprehensive analysis of various alternative highway alignments throughout the entire corridor. The methodology and procedures were consistent with recent feasibility studies conducted in other high priority corridors. It included: travel demand modeling and forecasting; consideration of NAFTA/international trade flow; economic feasibility analysis, including travel efficiency, economic development, and the benefits for national, state, and

[5] FHWA. Office of Freight Management and Operations.

corridor perspectives; evaluation of traffic operations; engineering cost estimates; potential environmental land use impacts; and a public involvement program. Exhibit 2-16 shows the Ports to Plains Corridor study area.

Exhibit 2-16: Ports to Plains Corridor Study Area



In addition, special consideration was given to impact evaluation of infrastructure and Intelligent Transportation System (ITS) improvements planned at the U.S.-Mexico border. The study considered other highway improvements planned throughout the corridor states, as well as proposed transportation improvements and highway connections in Mexico.

In the fall of 2003, a contract was awarded by the Texas Department of Transportation (TxDOT) for the preliminary design and costs of developing a specific alignment within the Ports to Plains Corridor.

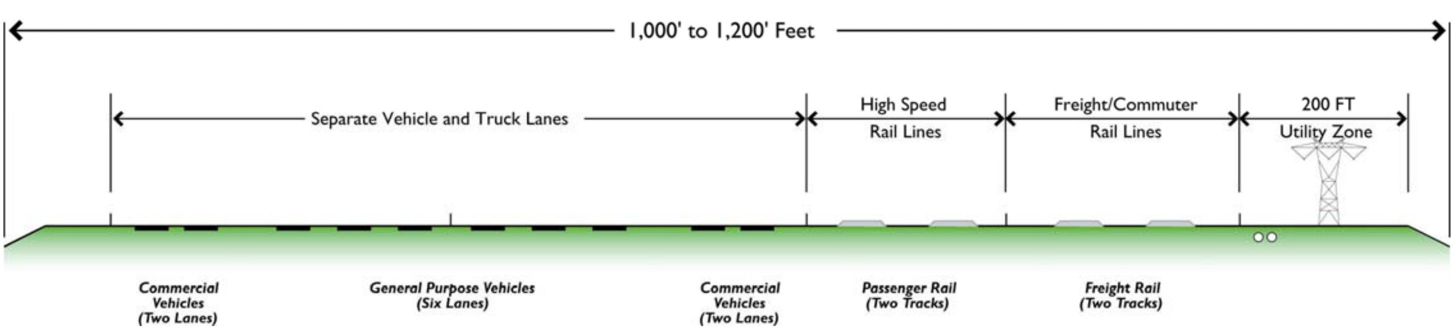
TxDOT issued in July 2003 a call for proposals to acquire, develop, design, construct, finance, maintain, and operate a combination of facilities which together constitute the I-35 High Priority Trans Texas Corridor. The I-35 Project includes facilities which parallel the I-35 corridor and includes portions of the I-37 and I-69 high priority Trans Texas Corridors where necessary for connectivity and financing purposes. The proposed Project includes tolled truck and vehicle lanes, high speed passenger rail, commuter rail, freight rail and utility infrastructure and may also include intermodal facilities. TxDOT is currently developing the specific contractual relationship for development of the Project that will be set forth in a Comprehensive Development Agreement. TxDOT's current vision is that the successful Proposer will become a long-term strategic development partner with TxDOT, helping the agency analyze, identify, plan and finance Project facilities and develop the Project on a multi-modal, multi-facility basis over the short-term, mid-term and long-term.[6]

Corridor Plan

The Trans Texas Corridor Plan outlines a very aggressive "new vision" for a new multi-use, statewide transportation corridor that moves people and goods safely, efficiently, and more reliably, while improving quality of life. The Trans Texas Corridor Plan provides a design concept, identifies four priority corridor segments, details the financial tools necessary for implementation, and addresses the importance of public private partnerships. The concept would be connected by a 4,000 mile network of corridors up to 1,200 feet wide with separate lanes for passenger vehicles (three in each direction) and trucks (two in each direction). The corridor would also include six rail lines (three in each direction), one for high-speed passenger rail between cities, one for high speed freight, and one for conventional commuter and freight. The third component of the corridor would be a 200-foot-wide dedicated utility zone for the transmission of electricity, natural gas, petroleum, data, and most importantly water. Exhibit 2-17 shows a typical cross section of the Trans Texas corridor[7]

Separating passenger vehicle and truck lanes to benefit the public is fundamental to the corridor's overall design. To avoid contributing to urban congestion, the corridor would link major cities but not flow directly through them. The corridor would also be designed to take advantage of intelligent transportation systems.

Exhibit 2-17: Conceptual Trans Texas Corridor Cross Section



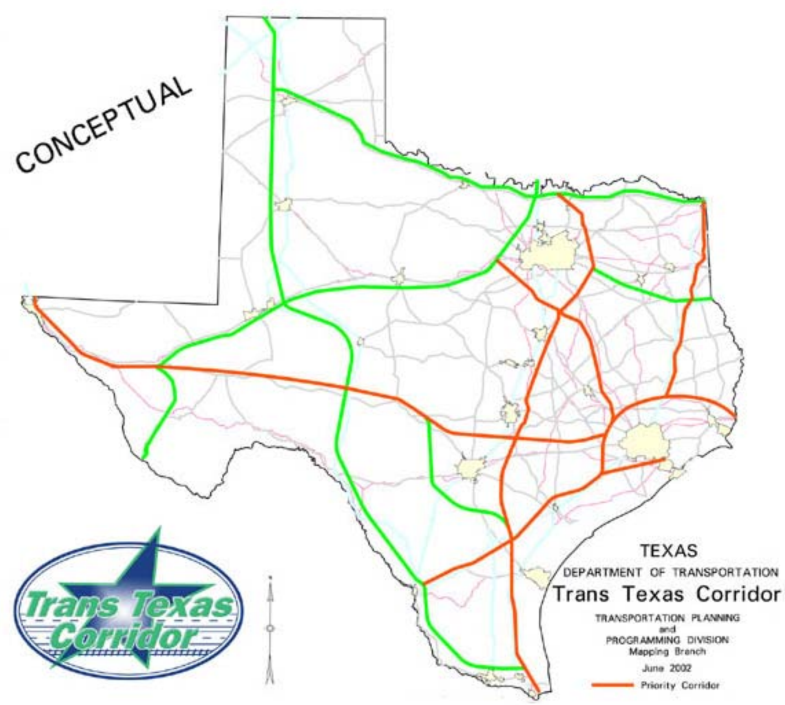
6 Website: http://www.dot.state.tx.us/tta/profserv/i35/default.htm.
7 Website: http://www.dot.state.tx.us/ttc/ttc_report_summary.pdf.

Based on an estimated cost of $31.4 million per centerline mile, the 4,000-mile corridor would cost $125.5 billion, not including right-of-way and miscellaneous costs. Factoring in right-of-way at $11.7 billion to $38 billion and miscellaneous costs at $8 billion to $20 billion, the estimated total cost for the Trans Texas Corridor would range from $145.2 billion to $183.5 billion.[8]

The objectives of the Trans Texas Corridor Plan include the ability to move/transport people and freight faster and safer; relieve congested roadways; keep hazardous materials out of populated areas; improve air quality by reducing emissions; and support local and regional economic development and international trade.

Four corridors have been identified as priority segments of the Trans Texas Corridor in Exhibit 2-18. These corridors parallel I-35, I-37 and I-69 (proposed) from Denison to the Rio Grande Valley, I-69 (proposed) from Texarkana to Houston to Laredo, I-45 from Dallas-Fort Worth to Houston, and I-10 from El Paso to Orange.[9]

Exhibit 2-18: Conceptual Trans Texas Corridor Priority Segments



The proposed I-69 extension would connect three different border crossings in Texas (Laredo, McAllen, and Brownsville) to I-465 in Indianapolis; from there, traffic would continue over the existing I-69 and other freeways to border crossings in Detroit, Port Huron or Sault Ste. Marie, Michigan. Approximately 1,600 miles of freeway (including the three Texas branches) would be

[8] Ibid.
[9] Ibid.

added to existing I-69 when it is complete. In some areas, particularly in Kentucky, Mississippi, and Texas, much of I-69 would probably be built as upgrades of existing four-lane highways to current freeway standards, while in other areas new construction on new alignment is likely. In Texas, I-69 was initially expected to follow existing U.S. 59, 77 and 281; however, the Trans Texas Corridor Proposal has subsequently surfaced with a plan for a new facility roughly along the same corridors.[10]

Today I-69 connects Indianapolis with the Canadian border at Port Huron, Michigan and Sarnia, Ontario and provides an important link between the lower Midwest and Canada. The dynamic trade corridor that I-69 provides has served as the catalyst for the current plans to extend I-69.

Implementation Schedule

TxDOT and the Federal Highway Administration (FHWA) are funding and managing the necessary corridor studies. Together, eighteen federal, state and other agencies are working to find mutually acceptable transportation solutions along/in the I-69 corridor. Environmental studies in all 14 Texas "Sections of Independent Utility" (SIUs), or sections of the corridor that serve a purpose and need independent of the other sections, should be underway by the end of August 2003.[11]

Financing

Texas voters provided the framework for funding such an aggressive plan in November 2001 when they approved Proposition 15. Proposition 15, a constitutional amendment, allows Texas more flexibility than it has ever had to pay for transportation projects. Proposition 15 includes public-private partnerships called "exclusive development agreements", and funding options like toll equity, the Texas Mobility Fund, and Regional Mobility Authorities (RMAs). Financing options for this aggressive plan would include a combination of these tools.[12]

<u>Exclusive Development Agreement</u> – This is a contract between the state and a consortium to perform any or all of the following tasks: design, construction, operation, maintenance or financing of a transportation project. The state determines the overall need for a project and then considers proposals from competing consortiums on how the final project can be accomplished. The state then can select the consortium that proposes the method offering the best value for the project.

<u>Toll Equity</u> – This is a financing option that makes potential toll projects more viable and can speed up relief from congestion while stretching limited state transportation funds. Toll equity allows state highway funds to be combined with other funding sources to help pay for toll roads, and makes projects more attractive for additional private sector investment.

[10] Website: http://www.i69info.com/.
[11] Website: http://www.i69corridorstudy.com/central/poverview/.
[12] Website: http://www.dot.state.tx.us/ttc/ttc_report_summary.pdf.

<u>Regional Mobility Authority</u> – These are new mobility authorities that operate much like existing toll authorities, but with additional benefits. These authorities will be initiated on the local level and will have the ability to build, operate and maintain newly-created local toll projects.

<u>Texas Mobility Fund</u> – This fund supplements the traditional pay-as-you-go method of financing highway transportation. It allows the Texas Transportation Commission (TTC) to issue bonds to accelerate construction of major highway projects. Funds can be used to finance road construction on the state-maintained highway system, publicly-owned toll roads or other public transportation projects. The state Legislature will be required to appropriate funds for the Texas Mobility Fund.

New Proposed Rules for RMA and toll roads were presented in 2003. The TTC was seeking public comment on proposed rules allowing TxDOT to convert non-tolled highways to toll facilities. Through an RMA, counties can establish an authority to develop, construct and maintain local turnpike projects as part of the state highway system.

In 2002 the commission approved the state's first RMA to serve Travis and Williamson counties. In August 2003, $63.2 million was provided for construction contracts putting nearly half of the SH-45 north toll road under construction serving these two counties. The TTC is seeking a public/private partnership to expedite the SH-45 southeast project, a candidate toll road project connecting I-35 and SH-130/US-183.

In addition, House Bill 3588 signed into law in June 2003 provides new financial tools to expedite needed construction. The new law allows TxDOT to enter into comprehensive development agreements with a private entity for the design, construction, financing, maintenance and/or operation of a turnpike project.

Summary

TxDOT, with their new funding mechanisms, are moving forward with the development of the Trans Texas Corridor Plan on several fronts; one corridor segment at a time. Four corridors have been identified as priority segments of the Trans Texas Corridor. These corridors were prioritized based on previous analysis and studies. Now that the strategic corridors have been identified and the authorization for public-private partnerships in place, TxDOT has begun the process of soliciting for private sector partners.

The authorizing legislation also put more control in the hands of communities by delegating power to local authorities (RMAs) and providing those local authorities means to fund projects.

Drafting the Future, the financing plan produced by TxDOT that accompanies HB 3588, has provided a two pronged approach in meeting the investment needs of the State's transportation system; a top down approach by the State and a bottom up approach for local communities, where both can take on the necessary planning, development and public-private partnerships.

Interstate 81 Development Plan

Background and Description

Interstate 81 is a major trade/commercial truck route in the U.S., linking the population centers of the Northeastern U.S. and Canada with the Alliance states, Southern Gulf Ports and South America. It is one of the top eight routes in the U.S. for carrying commercial truck traffic.

In Virginia, it extends along the western portion of the state, from the Tennessee border in the south to the West Virginia border in the north, a total of 325 miles. It has 90 interchanges and connects with Interstates 66, 64, 581, 77 and 381 as it travels through 21 cities and towns and 12 counties. There are no High Occupancy Vehicle (HOV) lanes or truck/commercial lanes on the existing highway.
The majority of Virginia's portion of I-81 is a divided highway with two lanes in each direction as it traverses the Shenandoah Valley with rolling and mountainous terrain. I-81 in Virginia has been declared, by the American Automobile Association, as one of the ten most scenic highways in the U.S.

Virginia's portion of I-81 is between thirty and forty years old. Construction began in December 1957 and by the end of 1966 a total of 214 miles of SR 81 was opened to traffic. The last section of Virginia's portion was opened to traffic on December 21, 1971, thus completing the entire 325 miles of the interstate.

I-81 is widely recognized as one of the most dangerous transportation corridors in the nation, primarily because of the high rate of accidents. During a recent 18-month period, there were 2,681 total accidents on I-81 with 41 deaths and 1,528 total injuries. Of that total, 825 were accidents involving commercial trucks resulting in 15 deaths and 449 injuries.

Some of the safety issues along this route result from the design, which was completed 40 years ago when traffic volumes were less, especially those issues related to commercial trucks.

Exhibit 2-19 provides information on freight shipments that have either an origin or a destination in Virginia. As shown, trucks moved a large percentage of the tonnage and value of shipments, followed by rail (tonnage) and air (value). Exhibit 2-20 shows freight flows to and from Virginia. Truck traffic is expected to grow throughout the state over the next 20 years.

I-81 is significant to the area's transportation needs for several reasons. It provides mobility to commuters traveling and working in the New River and Roanoke Valleys, and to the students and supporters of the many colleges and universities throughout the corridor, such as Virginia Tech (25,420 students) and James Madison University (15,152 students). Additionally, there are many historic and natural resources along this route, which results in a large volume of tourist and recreational vehicles.

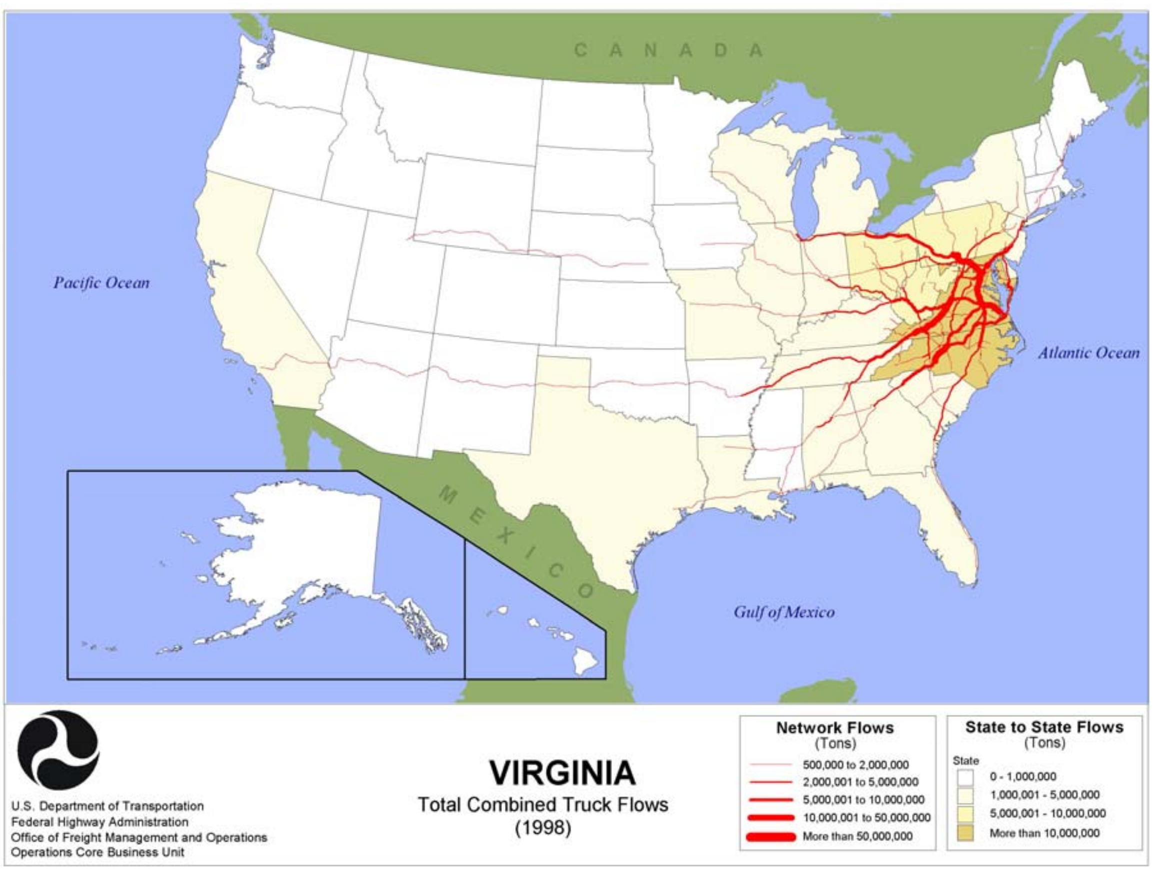
Exhibit 2-19: Freight Shipments To, From, and Within Virginia
Year 1998, 2010, and 2020

	Tons (millions)			Value (billions $)		
	1998	**2010**	**2020**	**1998**	**2010**	**2020**
State Total	530	753	904	346	680	1,115
By Mode						
Air	<1	1	1	30	73	129
Highway	339	495	612	290	560	914
Other[a]	9	13	16	1	2	3
Rail	158	209	234	19	33	52
Water	24	34	40	5	11	17
By Destination/Market						
Domestic	457	647	777	290	567	915
International	73	105	126	56	113	200

Source: FHWA, Office of Freight Management and Operations.

Notes: [a]Includes international shipments that moved via pipeline or by an unspecified mode.

Exhibit 2-20: Total Combined Truck Flows to and From Virginia



As a result of these varied uses, mixed use traffic congestion causes major safety concerns as well as lost economic dollars to the Alliance states and the U.S. Furthermore, the terrain complicates the congestion problem as the capacity of the right-most lane is almost fully occupied by heavy truck traffic that slowly creeps uphill along the long, steep upgrades. This combination creates inefficiency in the movement of people and the delivery of raw material and goods through the trade corridor.

Congestion is also a major issue during non-peak hours when speeds frequently slow to 30 mph or less. Additionally, traffic caused by the students, parents, faculty, alumni and supporters of the many colleges and universities throughout the corridor, especially during peak times in the school year (such as "move in", graduation and sporting events) exacerbate traffic problems on the interstate.

The traffic volume on I-81 is extremely heavy and currently ranges from an Average Daily Traffic (ADT) volume of 32,000 vehicles per day (vpd) to 64,000 vpd. Originally, the design anticipated only 15% truck traffic. However, since the completion, traffic has tripled and the commercial truck traffic is in the range of 20% to 37%. Overall traffic growth is expected to be 3.5% annually, with truck traffic increasing at 4.5% annually. The peak Level of Service (LOS) throughout the corridor is a C or better except for two locations. By the year 2010, however, approximately one-third of I-81 will be at LOS D or worse, along with many ramps, ramp junctions and intersections having stop and go traffic conditions. The result of decreasing service levels will be effectively reduced operating speeds through large segments of the corridor.

The overall state of the facility is fair to poor, based on many factors including: pavement conditions, bridge conditions and appraisal ratings, safety issues, level of service, and maintenance expenditures. The majority of the bridge structures along I-81 are in fair condition. Eighty-nine percent of the bridges were built before 1970 with 26% of the bridges being over 40 years old. Eighteen of the bridges are structurally deficient, while 64 of the 291 main-line bridges are functionally obsolete.

In 2000, the estimated cost per mile for all interstate maintenance in Virginia was $21,800 per lane mile. The Maintenance Division was projecting that the maintenance cost per interstate lane mile in 2001 would be $29,000. For I-81, the annual maintenance per mile was higher and amounts to approximately $32,500.

Corridor Development

The Virginia Department of Transportation (VDOT) completed a study of the entire corridor which in 1999. As a result of this study, VDOT planned to improve the facility to a six-lane divided highway at an estimated cost of $3.4 billion. The current amount of funding available from 2003 on would be approximately $35 million annually for the next six years.

Using normal funding methods, the widening and rehabilitation of Virginia's 325 miles would take 30 to 50 years. During this time the highway would become increasingly inefficient and extremely dangerous.

Improvements to I-81 could provide an economic stimulus for the entire I-81 corridor. One recent study by the American Road and Transportation Builders Association estimates that 34,437 jobs are generated by every $1 billion spent on transportation projects. In a number of communities along the route, unemployment far exceeds the state and national average, so new jobs would be welcome. In addition, spending in localities would also boost local and state tax revenues.

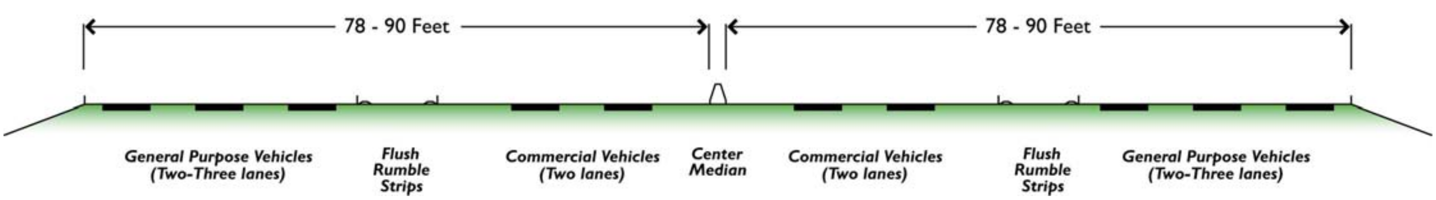
Just-in-time delivery is becoming more important to businesses, and delays caused by accidents and congestion impair efficiency and could make the region less attractive to business prospects. Improvement development plan for I-81 is timely.

Corridor Plan

A consortium of developers, contractors, and engineer's s, proposed to design, build, finance, operate, maintain, and transfer a rehabilitated and widened I-81 in Virginia.

A primary component of the plans was to separate the commercial truck traffic from the other traffic. The typical section would be a minimum of four lanes, with the two inside lanes dedicated to commercial trucks and the two outside lanes for the other vehicles. The I-81 corridor concept allows for a maximum of three general purpose vehicle lanes in each direction, at a maximum paved width of approximately 90 feet per direction. The conceptual cross section is shown in Exhibit 2-21. Exhibit 2-22 shows a photo-simulation of the corridor. A four foot rumble strip would separate the lanes. There would be dual interchanges separating commercial trucks and other vehicles at the five interstate connections and at other interchanges that have a high volume of trucks. Truck rest areas would be built in the median and weight-in-motion would be accomplished in the pavement area with violators addressed at nearby rest areas.

Exhibit 2-21: Conceptual Interstate 81 Cross Section



Other options within the plan include installing, maintaining and leasing fiber optic cable along the entire roadway and the operation and maintenance of an Intelligent Transportation System.

Asset Management of the existing and reconstructed facility and of the existing rest areas is included.

Additionally, the consortium would provide a fixed cost and schedule for this route. The fixed schedule would provide for completion of the entire 325 miles in 15 years from the date of the execution of a comprehensive agreement.

Exhibit 2-22: Photo Simulation of Interstate 81 Corridor

Implementation Schedule

Two proposals to enter into public-private partnerships with VDOT have been submitted by two large consortiums that include engineering, financial and construction professionals to improve Interstate 81 in Virginia. Both proposals, submitted by STAR (Safer Transport and Roadways) Solutions and Flour-Daniels, can be found on the VDOT website: http://www.virginiadot.org/.

Both proposals were submitted to affected jurisdictions along the I-81 corridor in Virginia for review and comment over a 60 day period as authorized by Virginia's Public Private Transportation Act (PPTA) of 1995. This action highlights the very important integration/involvement process of the community stakeholders along the I-81 corridor. The STAR proposal won the recommendation of VDOT.

Both proposals include plans for the multi-modal use of rail to divert freight. Improvements to the existing rail line would give the Norfolk Southern network the capacity it needs to divert 500,000 to 560,000 trailers per year from I-81. Additionally the improvements would provide Virginia Railway Express (VRE) with the rail capacity to implement a portion of its strategic plan and extend commuter service from northern Virginia to the Haymarket area. Under the Fluor team's proposal for example, rail improvements would be financed through a surcharge on freight cars traveling on the rail lines through Manassas. The new proposed surcharge would be significantly less than the toll proposed for commercial traffic on I-81. New revenues would help secure a federal loan pursuant to the Railroad Rehabilitation and Improvement Finance program administered by the Federal Railroad Administration.

Virginia's PPTA allows private industry to propose innovative solutions to the state's transportation needs at a time when declining state revenues had brought severe transportation budget cuts. The PPTA of 1995 was amended in 2002 by the Virginia General Assembly to remove the restriction on tolls on existing interstates. This amendment allows for a toll on trucks to help finance the much needed improvements to I-81 and helped bring Virginia law in line with legislation adopted by Congress in 1998 that created a pilot program to permit tolls on existing interstates. Under the pilot program, tolls may be levied on an existing interstate if the funds would be used exclusively to support reconstruction and improvements to that road.

Financing

The finance plan would use several sources of funds. State and Federal funds would be supplemented with a toll on commercial trucks. This tolling would be accomplished using state of the art technology without booths. Toll readers would be placed at all truck entrances and exits and tolling would be only for the miles traveled.

These 325 miles cannot otherwise be functionally improved without the collection of tolls because current Federal and State funding is not adequate to improve the facility in the foreseeable future.

Federal earmarks for the entire improvement to I-81 are not realistic in light of current interstate reconstruction needs across the United States. The use of state bonds to improve the entire facility would greatly impact Virginia's bond capacity and could jeopardize its AAA bond rating. Due to the immediate need to increase capacity and improve safety for the entire corridor, the state cannot wait 30 to 50 years to improve I-81. Consequently, a combination of State and Federal funds, along with toll revenue bonds, offers the best case for funding an improved I-81. This approach, along with Virginia's ability to work with private companies through the PPTA, would deliver this project in 15 years as opposed to the 30 to 50 years under normal financing.

The tolling of vehicles on Interstate Roads in Virginia required enabling legislation which was enacted by the Virginia General Assembly in the 2002 session. This legislation specifically prohibits the tolling of passenger vehicles.

Summary

The Commonwealth of Virginia understands the significant role they have in maintaining a reliable, efficient and cost effective transportation system that supports an expanding multimodal freight system to enhance economic development and trade. By understanding their role, the state articulated a vision based on a study of the entire corridor. The Legislature demonstrated their support for this vision by amending the Virginia PPTA of 1995 in 2002 to remove the restriction on tolls on existing interstates.

VDOT; with the development plan, analysis and funding mechanisms in place, has solicited proposals from the private sector to include the design, construction, financing, maintenance and operation of this project and has selected a consortium of engineering, financial and construction professionals to improve Interstate 81 in Virginia.

Alameda Corridor

Background and Description

The Alameda Corridor encompasses an approximately 20-mile corridor from the Ports of Long Beach and Los Angeles to downtown Los Angeles. This corridor provides heavy rail linkages between the freight facilities at the Ports and the rail hub near downtown Los Angeles' Transcontinental rail yards and railroad mainlines. Exhibit 2-23 shows the Alameda Corridor alignment.

The Alameda Corridor handles an average of 35 train movements per day. Usage is projected to steadily increase as the volume of international trade through the ports grows. The ports project the need for more than 100 train movements per day by the year 2020. Under its current configuration, the Alameda Corridor can accommodate approximately 150 train movements per day. The Alameda Corridor is intended primarily to transport cargo arriving at the ports and bound for destinations outside of the five-county Southern California region (imports) or originating outside the region and shipped overseas via the ports (exports). This accounts for approximately half of the cargo handled by the ports. The other half of the cargo handled by the ports is bound for or originates in the region, and that cargo is transported primarily by truck.[13]
Currently, more than 10 million 20-foot containers pass through the Ports of Los Angeles and Long Beach each year, with a cargo value of over $200 billion, or one-quarter to one-third of the nation's waterborne commerce. According to the *Engineering News*-Record, annual trade activity is projected to increase from $157 billion to $253 billion for the Ports of Long Beach and Los Angeles. Imported freight into the Ports of Long Beach and Los Angeles consists primarily of retail goods, while exported freight consists of petroleum products, machine parts, and agricultural products. The top commodities by weight are crude petroleum or natural gas and petroleum or coal products. By value, the top commodities are transportation equipment and food or kindred products.[14]

[13] Alameda Corridor Transportation Authority, Newsroom Fact Sheet, Website: www.acta.org/newsroom_factsheet.htm.
[14] FHWA, Office of Freight Management and Operations.

Exhibit 2-23: The Alameda Corridor

Exhibit 2-24 provides information on freight shipments that have either origins or destinations in California. As shown, trucks on the highways carry the highest tonnage and value of freight shipments, with rail carrying the second highest tonnage and the third highest value.

Exhibit 2-24: Freight Shipments To, From, and Within California Year 1998, 2010, and 2020

	Tons (millions)			Value (billions $)		
	1998	**2010**	**2020**	**1998**	**2010**	**2020**
State Total	1,360	1,980	2,435	1,218	2,564	4,315
By Mode						
Air	4	7	11	220	522	945
Highway	1,108	1,626	1,988	900	1,866	3,093
Other[a]	37	51	60	5	10	15
Rail	150	230	298	80	147	233
Water	62	65	78	13	19	29
By Destination/Market						
Domestic	1,231	1,750	2,105	956	1,940	3,130
International	130	230	329	262	624	1,184

Source: FHWA, Office of Freight Management and Operations.
Notes: [a]Includes international shipments that moved via pipeline or by an unspecified mode.

Exhibit 2-25 shows freight flows to and from Los Angeles and highlights the importance of the Ports of Long Beach and Los Angeles, as well as the Alameda Corridor, in distributing freight movements to the Western States and throughout the US. Truck traffic is expected to grow throughout the state over the next 20 years. Much of the growth will occur in urban areas and on the Interstate highway system. Truck traffic moving to and from California accounted for 12 percent of the AADTT on the FAF road network. Nearly 32 percent of truck traffic involved in-state shipments, and 2 percent involved trucks traveling across the state and to other markets. Approximately 54 percent of the AADTT were not identified with a route-specific origin or destination.[15]

Current average speeds on the Alameda Corridor are 30-40 mph, compared with 10-20 mph on the branch lines. The shift in rail traffic to grade-separated expressway has increased public safety by eliminating conflicts between rail traffic and street traffic, and between rail traffic and pedestrians.

[15] Ibid.

Exhibit 2-25: Total Combined Truck Flows to and From Los Angeles, CA

Corridor Plan

The Alameda Corridor Transportation Authority (ACTA) is a joint-powers authority created by the Cities of Long Beach and Los Angeles in 1989 to oversee the financing, design and construction of the Alameda Corridor. The Governing Board of ACTA is a seven-member board representing the cities of Los Angeles and Long Beach, the Ports of Los Angeles and Long Beach, and the Los Angeles County Metropolitan Transportation Authority (MTA).

The Alameda Corridor runs through eight different jurisdictions in urban Los Angeles County, and required multiple detailed partnerships between public and private entities.

The Alameda Corridor is a 20-mile freight rail expressway between the neighboring ports of Los Angeles and Long Beach and the Transcontinental rail yards and railroad mainlines near downtown Los Angeles. The centerpiece is the Mid-Corridor-Trench, a below-ground railway that is 10 miles long, 30 feet deep and 50 feet wide. Exhibit 2-26 shows a detail of the Mid-Corridor-Trench, and Exhibit 2-27 is an aerial photograph of the Mid-Corridor-Trench. Exhibit 2-28 shows a photograph of the cross section within the Mid-Corridor-Trench.

Exhibit 2-26: Mid-Corridor-Trench Detail

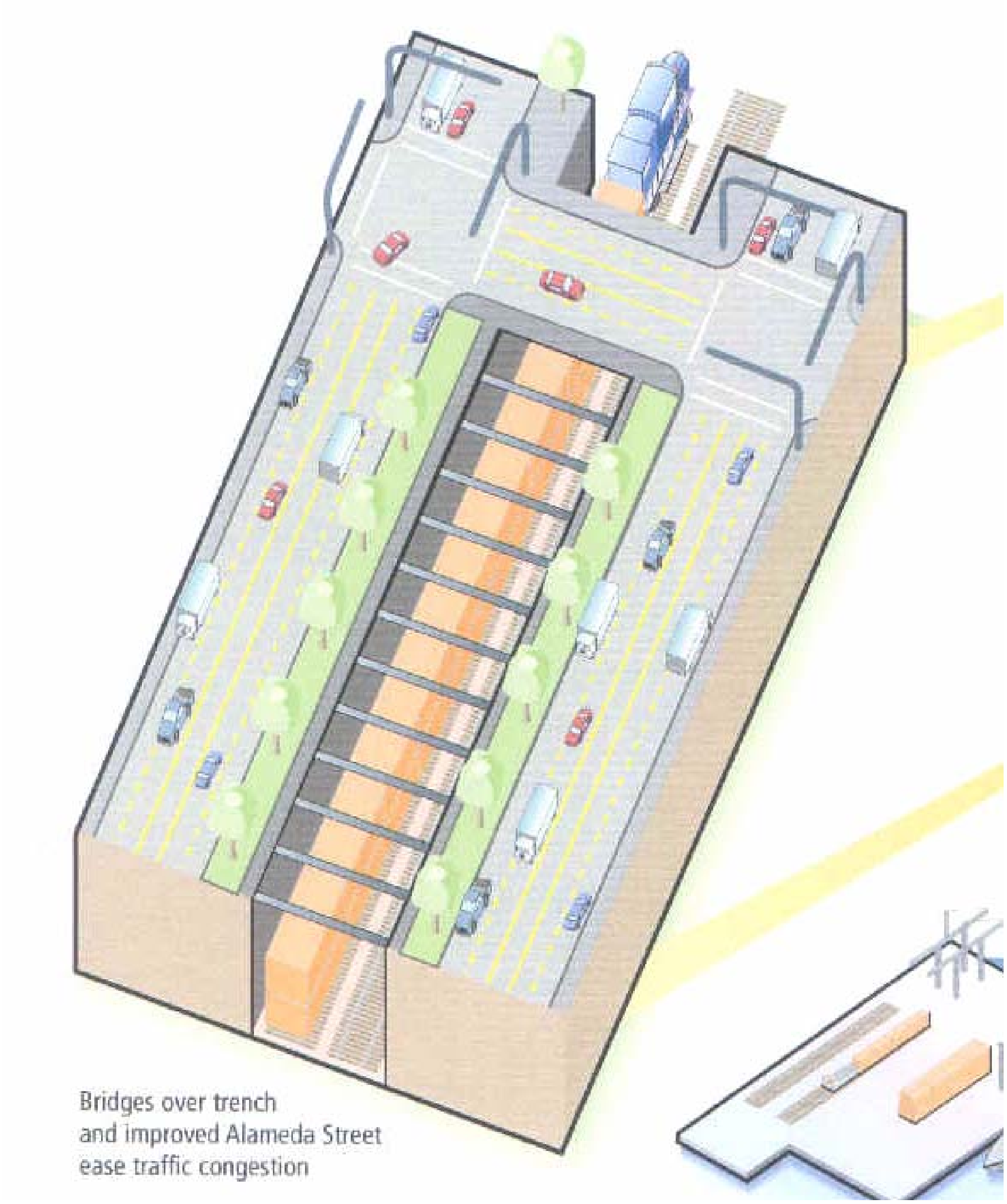


Exhibit 2-27: Aerial View of the Mid-Corridor-Trench

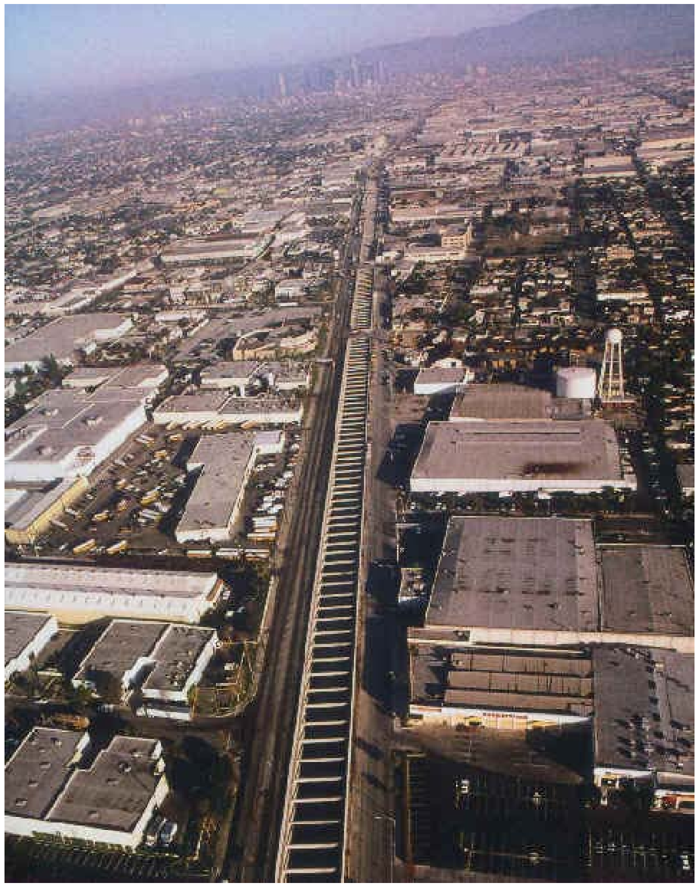
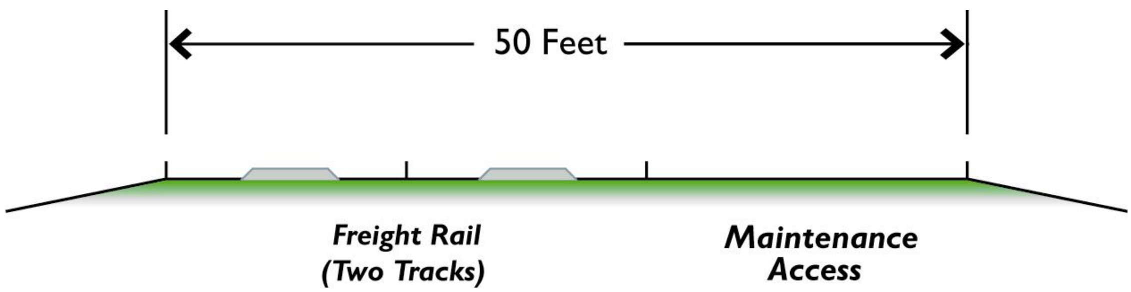


Exhibit 2-28: Mid-Corridor-Trench Cross Section

The Alameda Corridor consists of two rail lines, one in each direction. A typical cross section is shown in Exhibit 2-29.

Exhibit 2-29: Alameda Corridor Typical Cross Section



By consolidated 90 miles of branch rail lines into a high-speed expressway, the Alameda Corridor eliminated 209 highway rail crossings where cars and trucks previously had to wait for long freight trains to slowly pass. It also cut by more than half, to approximately 45 minutes, the time it takes to transport cargo containers by train between the ports and downtown Los Angeles. Additional benefits of the Alameda Corridor include:

- 54% reduction in emissions of idling cars and trucks.
- 28% reduction in emissions of locomotives.
- Increased efficiency of cargo distribution network to accommodate growing international trade.

Although the single rail line shared by multiple railroad companies meant more up-front construction cost, it results in less negative impacts in the long-term. This arrangement was approved through the Use and Operating Agreement between ACTA, Burlington Northern and Santa Fe Railway, and the Union Pacific Railroad in October 1998.

Implementation Schedule

The Alameda Corridor project required 15 years of advanced planning and five years of construction; however, construction was completed on time and within the budget. Permit facilitating agreements with corridor communities and utility providers, as well as the decision to utilize design-build contracts for the Mid-Corridor-Trench, helped ensure the project stayed on schedule. In addition, before construction began, ACTA negotiated separate Memoranda of Understanding with each jurisdiction along the route, detailing expedited permitting processes, routes for construction traffic, and the protocol for construction traffic control.

Additional success for the project was ensured through direct and tangible benefits to the community as a result of the project construction. For example, a project-supported conservation program hired some 300 youths to remove graffiti, plant trees and remove trash along the corridor.

Financing

Since opening in April 2002, the Alameda Corridor has assessed the railroads operators approximately $61 million on 4.6 million 20-foot equivalent container units (TEUs). These fees are used to pay off the bonds sold to assist in construction financing. The railroads pay TEU-based fees for cargo transported on the Alameda Corridor as well as for cargo departing or arriving in the five-county Southern California region by rail, regardless of whether the cargo actually traverses the Alameda Corridor.

The project was constructed at a cost of $2.4 billion by the Alameda Corridor Transportation Authority – a joint powers agency known as ACTA and governed by the cities and ports of Los Angeles and Long Beach and the Los Angeles County Metropolitan Transportation Authority. The Alameda Corridor opened on time and on budget on April 15, 2002. It was funded through a unique blend of public and private sources, including $1.16 billion in proceeds from bonds sold by ACTA; a $400 million loan by the U.S. Department of Transportation; $394 million in grants from the Ports of Long Beach and Los Angeles; $347 million in grants administered by the Los Angeles County Metropolitan Transportation Authority and $130 million in other state and federal sources and interest income. Debts are retired with fees paid by the railroads for transportation of cargo on the Alameda Corridor and for cargo transported into and out of the region by rail even if the Alameda Corridor is not used.[16]

Summary

The Alameda Corridor project successfully consolidated a number of privately owned and operated branch rail lines into a single shared-use corridor. In addition to providing benefits to the freight industry by reducing travel and transfer times between the high-volume Ports of Long Beach and Los Angeles, the consolidation of the multiple branch rail lines eliminated over 200 at-grade railroad crossings, which provide benefits to roadway congestion. The corridor also helps reduce the reliance on highways for freight movement, thereby providing additional benefits to congestion relief.

Through multi-agency coordination and planning, the ACTA was able to secure the necessary funding and support to complete the Alameda Corridor on schedule and within budget. The railroad companies pay fees for the transport of goods, which are used to pay down the debts incurred by the corridor during construction.

[16] Alameda Corridor Transportation Authority, Newsroom Fact Sheet, Website: www.acta.org/newsroom_factsheet.htm.

Highlights of the Similar Initiatives

Exhibit 2-30 provides a comparison of the geometric components, operational requirements, typical uses, and financing methods identified for each of the three similar initiatives discussed above.

Exhibit 2-30: Comparison of Similar Corridor Initiatives

Corridor	Geometric Components	Operational Requirements	Typical Uses	Financing
Trans Texas Corridor Plan	▪ 10 lanes for vehicles and trucks. ▪ Six Rail Lines. ▪ Separate utility right-of-way. ▪ Approximately 1,200 foot corridor width. ▪ Approximately 4,000 mile length. ▪ Lanes separated by unpaved areas.	▪ TXDOT Design Standards. ▪ High Truck Volumes. ▪ Typical highway design criteria (grades, curve radii, traffic volumes). ▪ 80 mph design speed for vehicle traffic, up to 200 mph design speed for high-speed rail. ▪ Few to no areas of substantial grades. ▪ Comprehensive corridor – Vehicle, rail, and utility components.	▪ Person travel. ▪ Goods / freight movement. ▪ Intercity transportation. ▪ Utility transmission. ▪ International / Interstate trade. ▪ Local and regional economic development.	▪ Estimated cost: $145.2 to $183.5 billion. ▪ Various Financing (from State Proposition 15) options include: Exclusive Development Agreements, Toll Equity, Regional Mobility Authorities, and Texas Mobility Fund. ▪ House Bill 3588 and *Drafting the Future* finance plans.
Interstate 81 Development Plan	▪ Approximately 325 mile length. ▪ Four lanes in each direction. ▪ Lanes separated by a rumble strip. ▪ No specified utility or rail component.	▪ VADOT Design Standards. ▪ 23% to 37% truck traffic. ▪ Dual interchanges to separate truck and vehicle movements. ▪ Average of 6% to 7% grades, much along rolling terrain. ▪ Vehicle component only.	▪ Intercity and interstate goods / freight movement. ▪ Person travel. ▪ Truck freight is diverted to rail to reduce congestion.	▪ Tolls (for commercial vehicles only). ▪ State and Federal funding sources. ▪ VPPTA allows tolling on the Interstate.
Alameda Corridor	▪ 20 mile length. ▪ Approximately 50 foot corridor width. ▪ One rail line in each direction. ▪ 10 mile trench, 30 feet deep, through commercial and residential areas.	▪ Currently accommodates 35 train movements per day. ▪ Can accommodate up to 150 train movements per day. ▪ Average speeds of 30 to 40 mph. ▪ Rail component only.	▪ Goods / freight movement. ▪ Eliminated 209 at-grade roadway crossings.	▪ Bonds issued by ACTA. ▪ Loans from USDOT, to be paid through collection of fees levied on the railroads. ▪ Grants from the Ports and LACMTA.

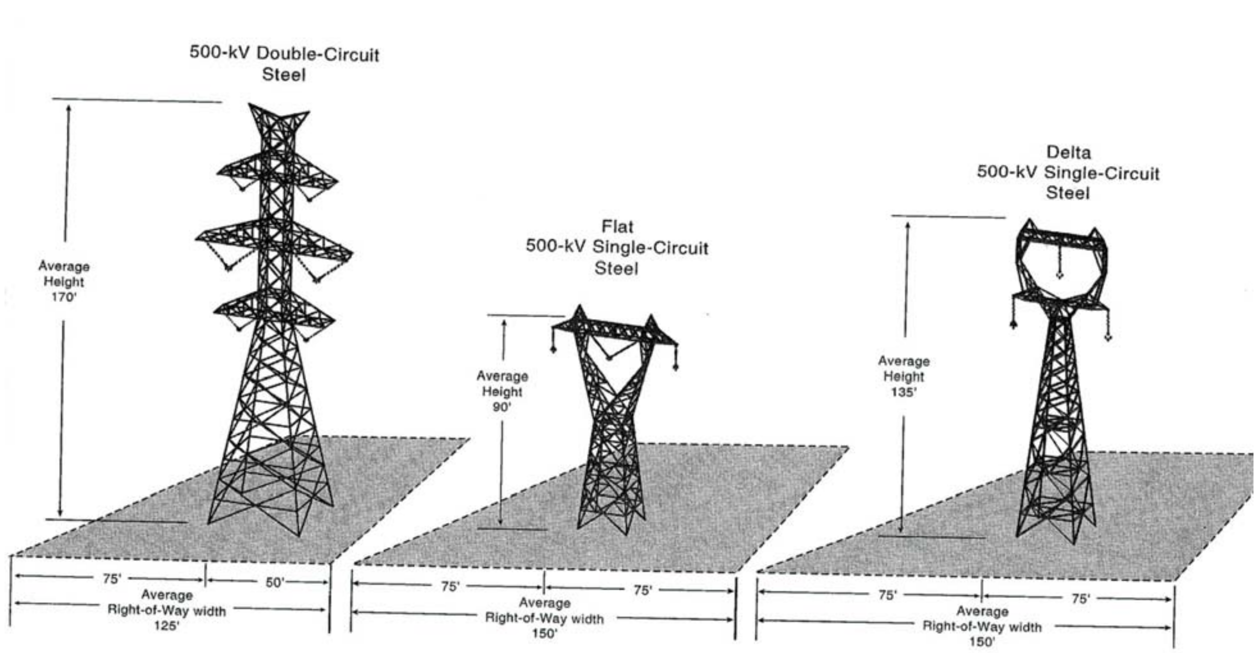
Utility Corridor Components

Throughout the United States there has been limited application or development of large scale utility corridors that combine petroleum, natural gas, electric power, and telecommunications. In the year 2000, nine utility providers in the western United States filed a plan to consolidate over 50,000 miles of high voltage transmission lines and form a regional transmission organization (RTO) known as RTO West.[17] The formation of the RTO, however, is intended to streamline the utility rates, and not to facilitate construction of the corridor. In fact, RTO West will be a non-profit independent system operator and will not initially own transmission wires and poles; nor will they build, maintain or repair facilities.[18]

A recent study by the United States Department of Energy Office of Fossil Energy examined the environmental impacts of an electric power transmission line through southern Arizona. Approximately 17 miles of the proposed transmission line would follow or cross a petroleum natural gas pipeline ROW.[19]

Exhibit 2-31 below shows the average ROW widths associated with 500-kV electric power transmission lines, used for the Schulz-Hanford transmission line project in Washington State.

Exhibit 2-31: ROW Widths for Electric Power Transmission Lines



[17] United States Department of Energy, Bonneville Power Administration, November 2000.
[18] Ibid.
[19] United States Department of Energy, Tucson Electric Power Company Sahuarita-Nogales Transmission Line Draft Environmental Impact Statement, July 2003.

CONCLUSION

The information contained in this chapter represents the early analysis of the feasibility assessment of the Washington Commerce Corridor. The chapter has established the following:

1. *The corridor concept and components* – As a preliminary basis for the feasibility analysis, this chapter has defined the corridor in terms of potential uses, design standards, right-of-way requirements, and minimum and maximum conceptual corridor cross-sections. The corridor concept and components presented in this chapter are preliminary in nature, and reflect the feasibility nature of this study.

2. *Probable alignment opportunities* – A second key component of the WCC feasibility analysis presented in this chapter are the probable corridor alignment opportunities. Using a broad-based review of major environmental, topographic, geometric design, and socio-economic factors, a number of probably alignment opportunities have been presented. These alignment opportunities have been developed to minimize impacts to the factors listed previously; however, it is understood that all reviews to this stage have been at the macroscopic level. As specific corridor alignment opportunities are examined further, in combination with the refinements to the corridor components, refinements to specific alignments alternatives will continue.

3. *Other similar initiatives* – This chapter presents examples of other similar initiatives undertaken throughout the United States, in order to summarize the current "state of the practice." Each of the similar initiatives discussed includes one or more of the components of the WCC, and an exhibit is included to compare these components and primary features.